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Response of Cylindrical Floating Structure Subjected to an Underwater Explosion

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Summary: This paper describes numerical simulations and experimental results of dynamic response of a cylindrical floating structure subjected to an underwater explosion. An explosion was generated by wire explosion method under the center of bottom plate. Responses of the cylinder were recorded in the experiments with three different offset conditions. Nonlinear explicit finite element method and finite volume method were used for the structural analysis and the fluid analysis respectively. Compressibility of fluid and fluid structure interaction were taken into account in the numerical simulation. Explosion bubble shape was observed with a high speed camera and were compared with the numerical simulation results. Experimental results of time histories of bottom surface pressures and displacement of the bottom plate were also compared with the numerical simulation results. Numerical simulation results regarding to dynamic response of the cylinder corresponded well with experimental results. Discussions are given to boundary effects on behavior of explosion bubble and offset distance effects on response of the cylinder.

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